

WHAT IS CLAIMED IS:

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Sub A1
1. A process of radiosensitizing or radioprotecting a cell to the effects of ionizing radiation comprising increasing the rate of transcription of a gene for a cell radiosensitizing or radioprotecting factor operatively linked to a constitutive promoter.

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Sub C1
2. The process of claim 1, wherein the cell is radiosensitized by increasing the transcription of the TNF- α gene.

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3. The process of claim 1, wherein the cell is radioprotected by increasing the transcription of MnSOD, IL-1, IL-2, or TNF.

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4. The process of claim 1, wherein increasing the transcription of a gene that encodes a cell radiosensitizing factor is accomplished by transfecting the cell with a genetic construct comprising a gene that encodes the cell radiosensitizing factor operatively linked to constitutive promoter.

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5. The process of claim 4, wherein the cell is radiosensitized by increasing the transcription of the TNF- α gene.

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Sub A2
6. The process of claim 3, wherein the constitutive promoter is the intermediate-early CMV enhancer/promoter, RSV enhancer-promoter, SV40 early and SV-40 late enhancer/promoter, MMSV LTR, SFFV enhancer/promoter, EBV origin of replication, actin, or Egr enhancer/promoter.

7. The process of claim 1, comprising transfecting the cell with a genetic construct comprising a gene that encodes the cell radiosensitizing factor operatively linked to a constitutive promoter.

8. The process of claim 7, wherein the transfection is by liposomes, adenovirus, HSV-1, or TIL.

9. The process of claim 8, wherein the liposome is DOTMA, DOTMA/DOPE, or DORIE.

10. The process of claim 8, wherein the transfection is by adenovirus.

11. The process of claim 8, wherein the transfection is by HSV-1.

12. A process of sensitizing cells to the effects of ionizing radiation comprising transfecting the cells with an adenovirus vector construct that comprises a cytokine expression region recombinant insert that expresses and secretes a cytokine in a mammalian cell.

13. The process of claim 12, wherein the vector construct comprising the cytokine expression region is positioned under control of a promoter other than an adenovirus promoter.

14. The process of claim 13, wherein the promoter is the intermediate-early CMV enhancer/promoter, RSV enhancer-promoter, SV40 early and SV-40 late enhancer/promoter, MMSV LTR, SFFV enhancer/promoter, EBV origin of replication, or Egr enhancer/promoter.

15. The process of claim 1, wherein increasing the transcription of a gene that encodes a cell radioprotecting factor is accomplished by transfecting the cell with a genetic construct comprising a gene that encodes the cell radioprotecting factor operatively linked to a constitutive promoter.

16. The process of claim 15, wherein the cell is radioprotected by increasing the transcription of MnSOD, IL-1, IL-2, or TNF.

17. The process of claim 15, wherein the constitutive promoter is the intermediate-early CMV enhancer/promoter, RSV enhancer-promoter, SV40 early and SV-40 late enhancer/promoter, MMSV LTR, SFFV enhancer/promoter, EBV origin of replication, actin, or Egr enhancer/promoter.

18. A process of radioprotecting a cell to the effects of ionizing radiation comprising:

- (a) operatively linking a gene encoding a cell radioprotecting factor to a constitutive promoter to form a genetic construct;
- (b) transfecting the cell with the genetic construct;

(c) exposing the cell to an effective dose of ionizing radiation.

5 19. The process of claim 18, wherein the transfecting is by liposomes, adenovirus, HSV-1, or TIL.

10 20. The process of claim 19, wherein the liposome is DOTMA, DOTMA/DOPE, or DORIE.

21. The process of claim 19, wherein the transfection is by adenovirus.

22. The process of claim 19, wherein the transfection is by HSV-1.

20 23. A process of sensitizing cells to the effects of ionizing radiation comprising transfecting the cells with an adenovirus vector construct that comprises a cytokine expression region recombinant insert that expresses and secretes a cytokine in a
25 mammalian cell.

30 24. The process of claim 23, wherein the vector construct comprising the cytokine expression region is positioned under control of a promoter other than an adenovirus promoter.

25. The process of claim 24, wherein the promoter is the intermediate-early CMV enhancer/promoter, RSV enhancer-promoter,

SV40 early and SV-40 late enhancer/promoter, MMSV LTR, SFFV enhancer/promoter, EBV origin of replication, or Egr enhancer/promoter.

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26. A process of radioprotecting cells to the effects of ionizing radiation comprising transfecting the cells with an adenovirus vector construct that comprises an expression region that comprises a recombinant insert that expresses and secretes a radioprotecting factor in a mammalian cell.

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27. The process of claim 26, wherein the vector construct comprising the expression region is positioned under control of a promoter other than an adenovirus promoter.

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28. The process of claim 27, wherein the promoter is the intermediate-early CMV enhancer/promoter, RSV enhancer-promoter, SV40 early and SV-40 late enhancer/promoter, MMSV LTR, SFFV enhancer/promoter, EBV origin of replication, or Egr enhancer/promoter.

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29. A pharmaceutical composition comprising a genetic construct comprising a gene that encodes a cell radiosensitizing or radioprotecting factor operatively linked to constitutive promoter dispersed in a pharmacologically acceptable carrier.

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30. The pharmaceutical composition of claim 29 further defined as comprising the vector construct packaged within a virion or virus particle.

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31. A method of increasing the levels of a radioprotecting or radiosensitizing factor in a mammal comprising administering to the mammal an effective amount of the pharmaceutical composition of claim 29 or claim 30.

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32. The method of claim 31 wherein the administering is by means of an intravenous injection of from 10^8 to 10^{11} virus particles.

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33. The method of claim 31 wherein the mammal is a mouse.

34. The method of claim 31 wherein the mammal is a human.

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35. A process of inhibiting growth of a tumor comprising the steps of:

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*See
a4
cont.*
(a) delivering to said tumor a therapeutically effective amount of a DNA molecule comprising a constitutive promoter operatively linked to an encoding region that encodes a polypeptide having the ability to inhibit growth of a tumor cell, which encoding region is operatively linked to a transcription-terminating region; and

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(b) exposing said cell to an effective dose of ionizing radiation.

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36. A method of assessing the response of cells to the constitutive production of radiosensitizing or radioprotecting factors following ionizing radiation, comprising:

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Sub
Q4
cont.
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add
C9
- (a) growing cells in culture;
 - (b) transfecting the cells with a genetic construct comprising a gene that encodes the cell radiosensitizing factor or radioprotecting factor operatively linked to a constitutive promoter; and
 - (c) exposing the cells to an effective dose of ionizing radiation.